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# JOURNAL OF ELECTRICITY

## POWER AND GAS

**Devoted to the Conversion, Transmission and Distribution of Energy**

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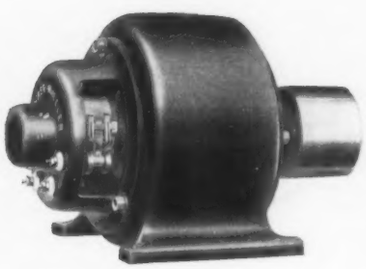

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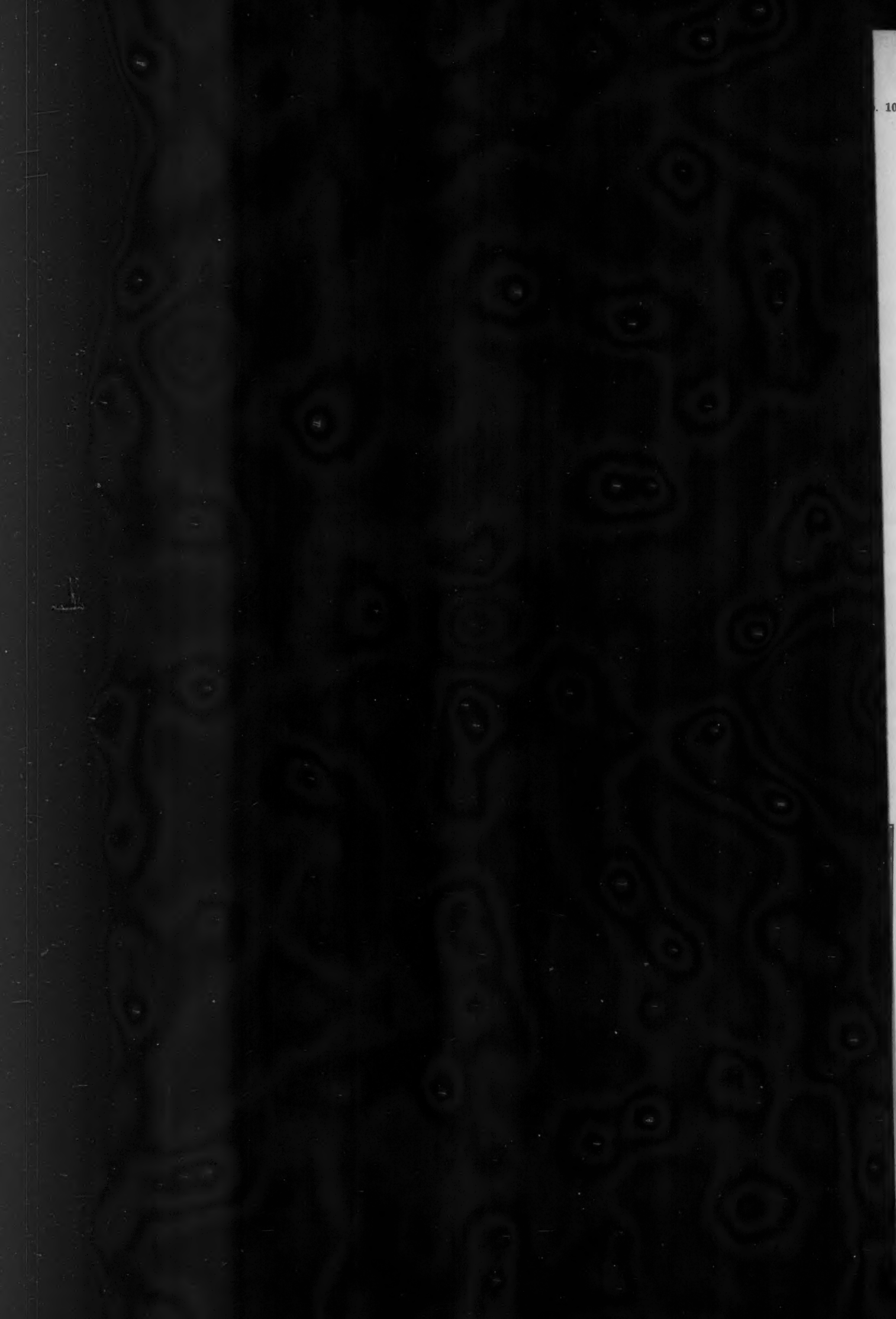

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POWER AND GAS
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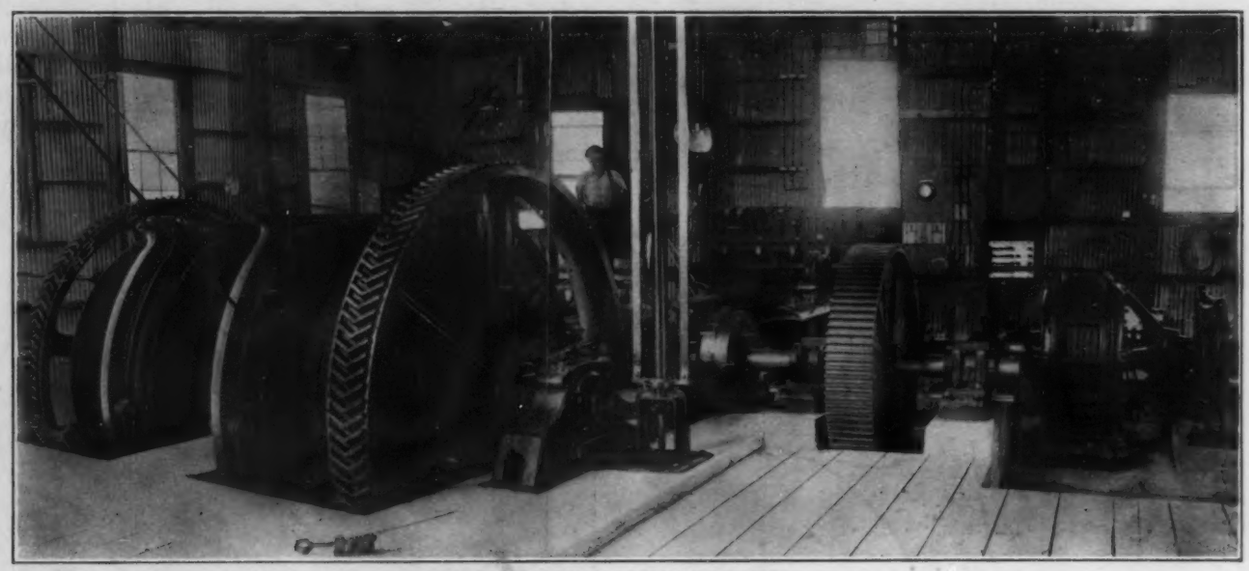
# ELECTRIC HOISTING ON THE MOTHER LODE

BY M. M. BOGGESS.

In the past two or three years, the mine operators along the Mother Lode in California have awakened to the possibilities of electric drive in connection with hoists. This has been brought about principally by the success of electrically driven mills, compressors, pumps and blowers, which demonstrated that the electric motor was an efficient, reliable, compact and cheap power, requiring little expense for maintenace.

Not only is the electric service reliable, but it is less expensive than any other power which is available in this particular section. The cheapness of the power, together with the lower first cost of the motor, is such that practically all of the new installations are electrically driven, while a great many of the older ones have found it wise to abandon their former methods and install electric power.

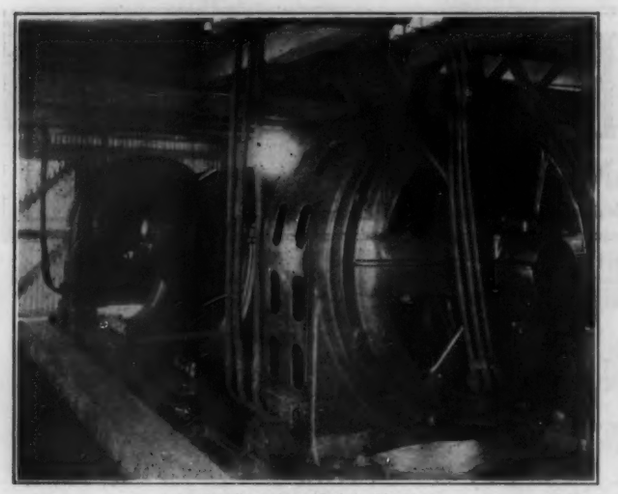


Electric Hoist at Lightner Mine.

The power companies deserve much credit for this awakening, due to their unceasing attempts to render reliable, continuous service. This has been accomplished by arranging the switching apparatus to tie in with several of their various stations. In the event of any trouble to the station supplying a certain load, it only requires a few seconds' time to switch over to one of the others, and the service is practically uninterrupted. This reliability of service was essential before the electric hoist could be installed, as it is the main artery of the mine, and the only way by which the men underground can reach the surface, in case of necessity.

The largest electric hoist in California is at the South Eureka Mine, near Sutter Creek. This consists of two General Electric 400 h.p., 450 r.p.m., variable speed slip ring type motors, mounted on a common base, with a rope sheave between them. The other sheave is mounted on the pinion shaft to which the hoist drums are geared. The hoist is of the jaw clutch type, with post brakes, and was originally driven by a steam engine, having one cylinder on each side. This is shown by the illustration which also shows the ease with which electric drive may be applied to steam driven hoists. In this case the connection rod of the steam engine was removed, and a new

shaft pressed into the pinions, with an extension long enough to permit of a rope sheave at one end. The motors are controlled from the engineer's platform by means of a master controller, which operates two



South Eureka Hoist Motors.

primary and secondary current-limit magnetic contactor panels, one for each motor. In the illustration of this equipment two primary panels are shown, only one secondary being shown, the other secondary being exactly the same as the one illustrated.

Control Equipment at South Eureka Mine.

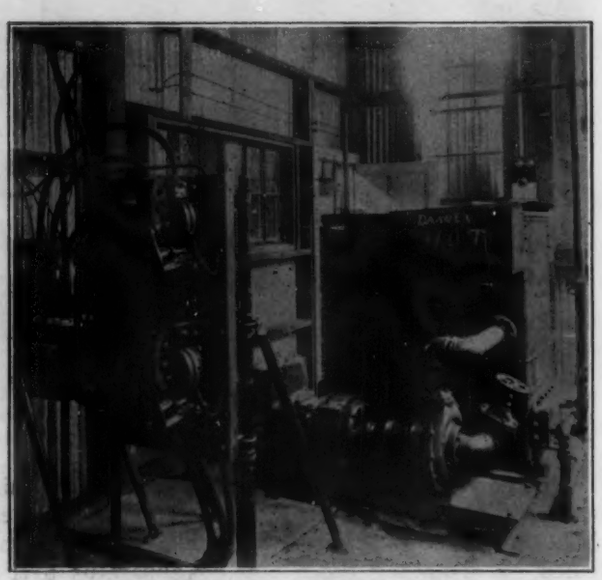
The circuits of the primary and secondary currents of these motors are made and broken on the panels, so only the low amperes required for magnetizing the contactor coils pass through the master controller operated by the hoist man.

The hoist has two drums, and generally operates in counter-balance, although the motors are designed to take care of the load when out of balance. The rope speed is 1200 to 1300 ft. per minute, and the total load, including cable with the loaded skip at the bottom of the shaft, is approximately 18,000 lb. The shaft is about 2700 ft. deep, with a slope of 65 degrees.

South Eureka Hoist Showing Change from Steam to Electric Drive.

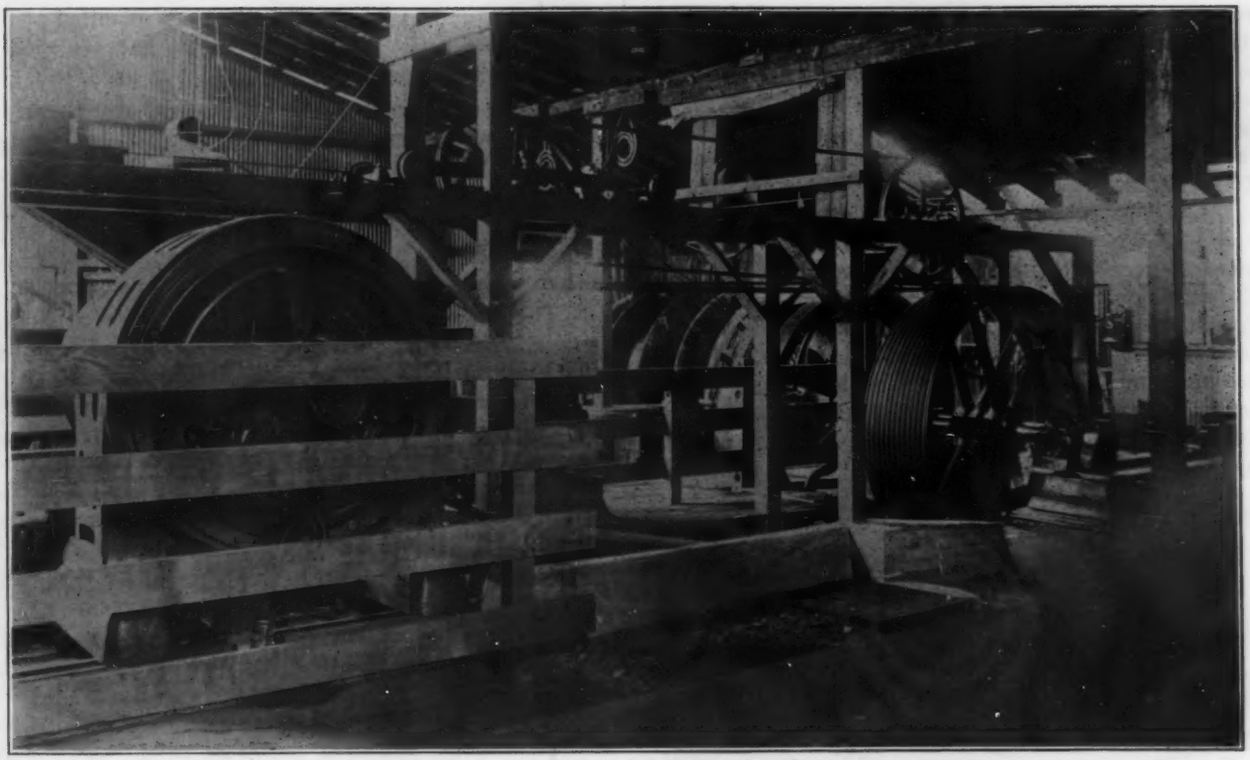
The cost of power has been reduced between 60 and 65 per cent, and the electric installation paid for itself in about a year, due to this great reduction.

The Keystone Mine, at Amador City has recently installed a 300 h.p., 450 r.p.m., variable speed General Electric induction motor and liquid rheostat control. This motor also replaces a steam engine, and in the first few months of operation has shown a saving of over 65 per cent in power. The motor is connected with the pinion shaft by means of a rope drive. The

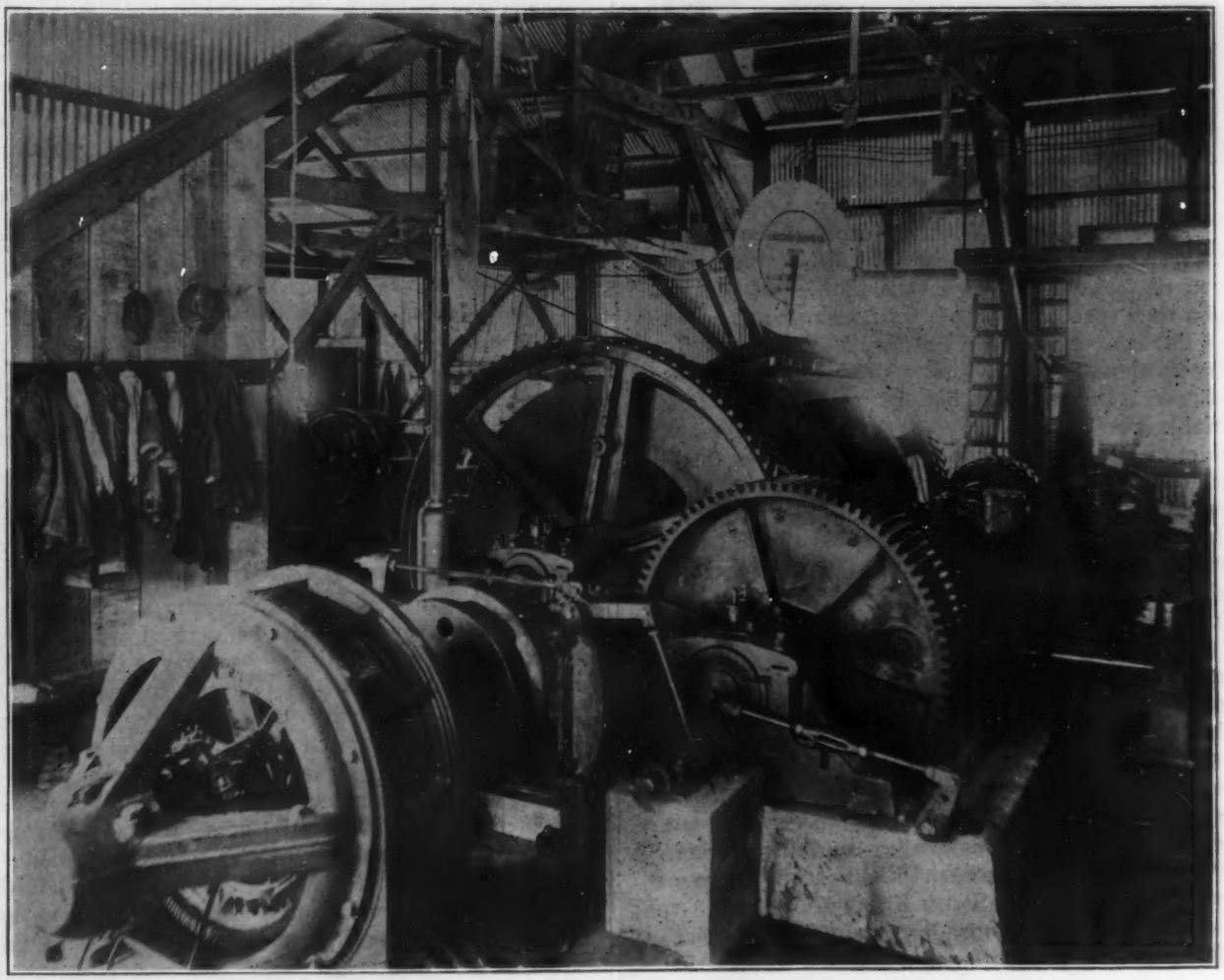


Control Equipment, Keystone Mine.

liquid rheostat control is in a separate room directly behind the engineer's stand. This rheostat is in the rotor circuit of the motor, and is used for varying the speed, while the magnetic contactors are used for opening and closing the primary circuit. The lever raising and lowering the weir which determines the height of the water on the rheostat plates, and consequently the motor speed, also operates the master con-



Electric Motor and Hoist at Keystone Mine.

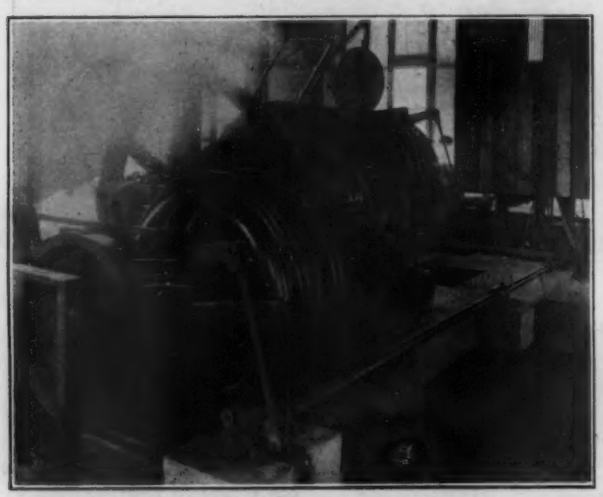


Electric Hoist at Treasure Mine.

troller, which closes the magnetizing circuit for operating the primary contactors.

This hoist has a load of about 14,500 lbs., including rope and loaded skip at the bottom of the shaft; the hoist speed is 700 ft. per minute; the shaft is 2600 ft. deep, and has a slope of approximately 52 degrees to the horizontal.

The hoist equipment at the Treasure Mine near Amador City consists of a 200 h.p., 600 r.p.m. variable speed General Electric motor, geared through a double reduction of gears to a double drum hoist of the jaw clutch and post brake type. The secondary of the drum controller is connected across the secondary of the motor and the resistance, while the primary fingers act as a master controller for operating a magnetic contactor panel. This arrangement does away with any arcing directly beneath the controller handle.



Electric Hoist at Plymouth Mine.

The shaft is about 1600 ft. deep and the hoist has a total load of approximately 6000 lbs., including rope, when the loaded skip is at the bottom of the shaft, and a rope speed of 800 to 850 ft. per minute.

The equipment of the California Exploration Company at the Plymouth mine at Plymouth, consists of a General Electric 225 h.p. intermittent hoist with variable speed 600 r.p.m. motor, geared through double reduction of gears to a double drum hoist of the friction clutch type, with post brakes. The controller equipment is similar to that used at the Treasure Mine. The rope speed is approximately 700 ft. per minute; depth of shaft, 1600 ft. vertical, and total load, including rope with loaded skip at the bottom of the shaft, is approximately 8500 lbs.

The first illustration shows the hoist equipment installed at the Lightner Mine at Angels Camp. It consists of a General Electric 200 h.p. variable speed induction motor, geared through a double reduction of gears to a double drum hoist. The control equipment consists of primary and secondary contactors, the latter being of the current limit type. These are operated by a master controller on the engineer's platform, and the equipment is similar in every way to that installed at the South Eureka Mine.

Among the other more important electric hoist installations may be mentioned a 150 h.p. General Electric motor, with primary control panel, installed at the Dutch Mine near Jamestown, which has replaced a steam drive, although the same hoist is used.

The Empire mine in Grass Valley, and the Hardenburg mine, near Jackson, have installed equipments exactly similar to the one at the Dutch mine.

The only 2200-volt hoist equipment is installed at the Melones mine in Calaveras county. It consists of a General Electric 250 h.p. variable speed motor, together with contactor panels, and master controller.

The Black Oak Development Company at Soulsbyville, in Tuolumne county, have replaced a water wheel with a 1000 h.p. General Electric variable speed hoist motor, and reports more economical operation. The Harvard mine has ordered a 250 h.p. General Electric variable speed hoist motor with control panel and master controller, similar to that installed at the South Eureka mine. This installation is also replacing a steam engine.

A standard primary contactor panel has been developed for use on hoist motors ranging from 100 to 200 h.p. It consists of overload relays, primary switch, and primary contactors. It is hardly necessary to install equipment so elaborate as those illustrated for the South Eureka and Lightner mines with these smaller motors, but it is desirable to do away with the breaking of the primary current on the controller fingers, the attendant care, and the arcing directly under the controller handle. It is for this reason these panels were installed, and found immediate favor at the Empire, Plymouth, Hardenburg and Dutch mines.

All the motors referred to above, with the exception of the one at the Plymouth mine, are rated according to their continuous horsepower, whereas the general practice in Europe is to rate hoist motors at least 25 per cent above their continuous horsepower, thus showing the conservatism of the American manufacturers.

It is gratifying to note the almost universal adoption of the electric drive in this section, and due to the peculiar conditions favorable to electric hoist, it is only a question of a few years before the steam and water driven hoists will be as uncommon as was the electric hoist three or four years ago.

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**Suit against the Forest Service** of the U. S. Department of Agriculture has been filed in the U. S. District Court at San Francisco by the Pacific Gas and Electric Company, asking that forestry officials be restrained from preventing the company from effecting certain improvements on its property adjoining the Tahoe National Forest and that the company be allowed to build an aqueduct over a corner of the forest reserve. The Secretary of Agriculture and the forest officials object to the elevation of the Lake Spaulding reservoir because, they assert, the water will overflow parts of the Tahoe National Forest, and are also opposed to the construction of the proposed aqueduct through a section of the forest reserve. The plaintiff holds that the Tahoe National Forest is a State property, over which the United States Government has no jurisdiction whatever.

## HYDRAULICS—III.

BY OTTO B. GOLDMAN.

### Irrigation Organization.

Making no pretense at presenting this series in logical sequence, we will at this time take up the matter of irrigation organization. Time was, when the engineer's duties were limited to the solution of the technical problems involved. Now he is called upon to solve the problems of organization, and to devise the entire system and organization so as to take advantage of the peculiarities of human nature. For the system must not only be mechanically operative, but must, above all, be financially successful. We not only want the highest efficiency of our plant, but also the maximum duty of our water, so that the whole can be shown to be a good investment. That is the measure of its worth. In other words our problem is to devise a system that will use as little water as possible and get it as cheaply as possible. Our equipment must then be efficient, our system such as to promote economy, and our organization such as to obtain the necessary funds cheaply. The usual forms adopted are (1) governmental, (2) Cary act and (3) association. The governmental, whether state or national, has one big advantage, in that it can obtain the necessary funds at the least cost. It has the disadvantage of being paternal. The system is literally grafted onto the settlers without consulting them as to any of the details thereof or the limit of cost per acre that shall be maintained. They have all been entirely operative, but none that has the writer seen could be called financially successful.

The Cary act, we will have to dismiss rather abruptly. Its motive is to put in a system as cheaply as possible and charge as much as possible. Private enterprise has many admirable qualities. But there is such a thing as too much of it, as for example the "farming" of taxes in Roman days or the issuing of "letters of marque" of a century or two ago. This act is no more or less than a privateer's license. That's pure piracy. It should be abolished. Any unsuccessful system is a trade killer.

The organization in the form of an irrigation district or association combines all the advantages of private enterprise with community action and lacks only the governmental advantage of cheap funds. It suffers from what might well be called discriminate credit. However, inasmuch as the greatest wealth of a nation is in its land, why cannot the government (state or national) furnish the necessary credit to community associations properly formed? Certain limitations will of course come to mind at once and these have been included in the following outline. Immense sections of country remain undeveloped because of the high tax money places on labor and brains. The attention of the legislative branch of our government should be called to the following:

(1) That the general organization of the association remain as at present.

(2) That it employ its own engineer to devise a system for the association.

(3) That copies of the plans be transmitted to each member of the association.

(4) That sufficiently thereafter, to have given time for deliberation, a meeting be called for the purpose of discussing, criticizing and offering alterations and amendments to the plans and a date be set on which to vote on the acceptance or rejection of the plans and any alterations and amendments offered. (5) when voted upon, if plans are adopted, they be sent to the government engineering department and the chief executive for approval, and if approved then (6) the district shall issue bonds to the extent of the estimate and convey them to the government who shall then (7) issue credit to the district to the extent of the bonds and at a rate of interest sufficiently in advance of that paid by the government, to poll all expenses inherent in the rendering of the service.

(8) As soon as this credit has been obtained then the district shall advertise for sealed bids for (a) furnishing the entire equipment, (b) doing all necessary installation and construction work.

(9) That the bids be awarded to the best responsible bidder.

(10) That an annual charge be assessed against each acre in the district which shall consist of two parts, (a) one in proportion to the acre cost of maintenance, interest on indebtedness and sinking fund, and (b) one in proportion to the actual amount of water used by each member of the association.

(11) That the payment of these assessments come under the laws now governing the payment of taxes.

Further details must of course be added to complete the organization, but are not of sufficient importance to warrant taking up further space at present. Once the above proposed organization is put to life by the necessary legislation, the development of the country can proceed unhampered. The organization would have all the combined advantage of government credit, community action and the energy, efficiency and initiative of private enterprise.

Very large and intricate systems usually do or rather should combine two or more of the following, viz: (1) irrigation, (2) reclamation, (3) navigation, (4) flood water control and (5) power development. These should undoubtedly be handled by the government. It may be best to turn this work over to the army engineers because of their freedom from political machinations, and because of their splendid record. It must be realized that the present organizations are not effective. Among other things, they lack health, or are they politically hampered? Let us illustrate. Along the Columbia River in Oregon the government is building the Celilo Canal. If a dam had, instead been thrown across the river at that point, not only would we have obtained the more rapid navigation of open slack water, but we would have had available approximately 300,000 h.p. All this power could have been used for the irrigation of the adjoining table lands. No, we are afraid the canal is a mistake of great narrowness and many miles in length, and many many millions cost. Inevitable as the coming dawn, that canal will one day be submerged. The neglected power is too valuable to leave long unused. In a subsequent article we will take up the problems of irrigation systems from the standpoint not only of making the farm pay, but making it a desirable place to live —a home.

# ELECTRICAL PUMPING AND IRRIGATION

## CEMENT PIPES AND DISTRIBUTING STAND PIPES.

BY B. A. ETCHEVERRY.

In Southern California many hundreds of miles of cement pipes have been used for the distribution of water to orchards and in recent years its use has been extended to some of the orchards in Washington and Idaho. While many orchardists in Southern California still prefer the open flume, there are the following objections to its use:

1st. Teams and farm implements can not cross the flume and there is always a strip of land on each side that can only be partially cultivated because it can not be crossed in the opposite direction.

2d. The flume is liable to be damaged by the teams and farm implements.

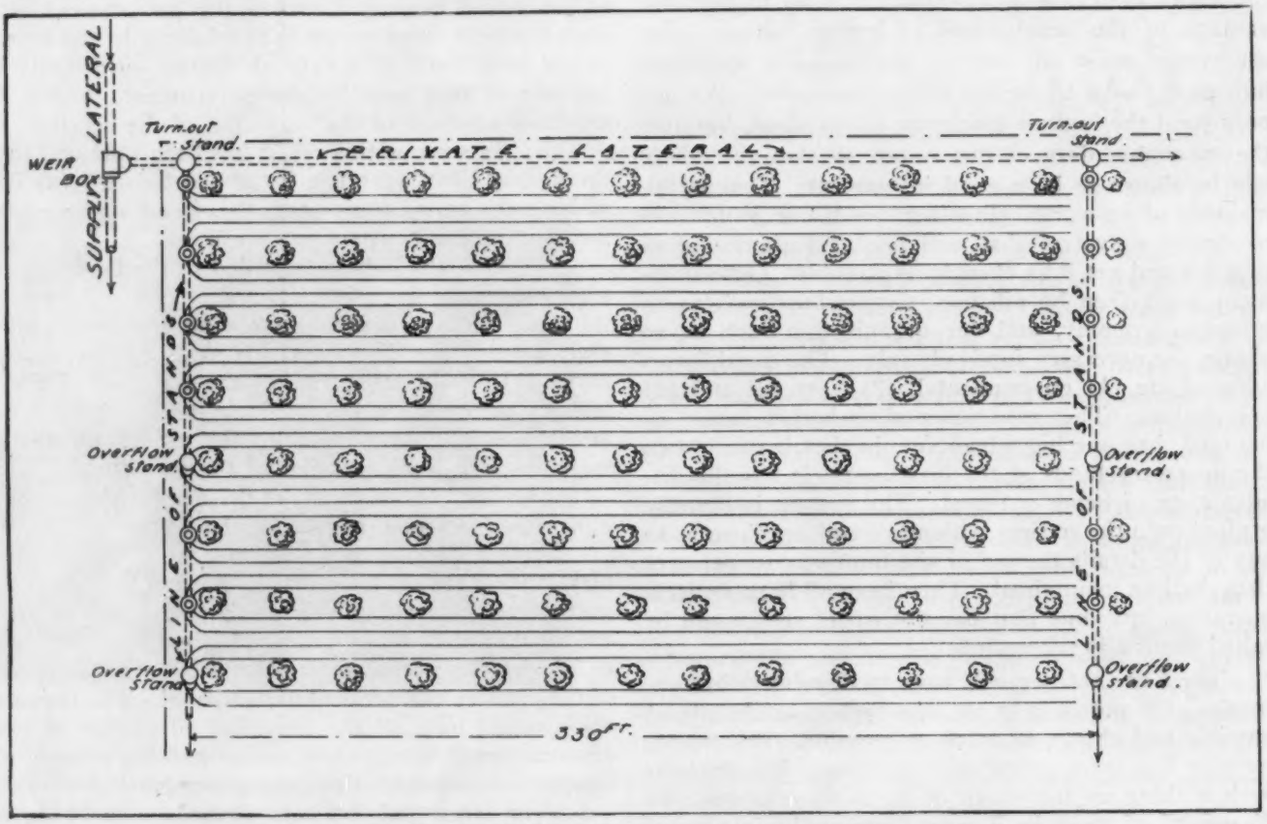
3d. The flume may settle and a crack if the earth underneath is washed away by the water passing through the spouts into the furrows.

4th. The furrows can only be made with teams and cultivators up to 15 ft. from the flume and they must be completed by hand.

5th. Leaves may fall in the flume and stop up either partially or completely the openings of the distributing spouts, which requires extra time on the part of the irrigator.

These disadvantages have led many of the orchardists to the use of underground pipes which do not interfere with cultivation. A complete underground pipe distributing system consists of:

1st. A main pipe line which carries the water from the measuring box or point of delivery to the lines of distributing stands which take the place of head ditches.




Cement Pipe System of Water Distribution for Orchard Furrow Irrigation.

Distribution of Water from Stand Pipe Into Furrows.

2d. The distributing lines which conduct the water from the main pipe line and which are connected to the distributing stands.

3d. The distributing stands or basins by means of which the water is brought to the surface and distributed into the furrows through small galvanized iron spouts inserted in the sides of the basin.

4th. Regulating boxes and accessories.

The pipe systems vary in the details of construction of the stand pipes and gates. They also vary in materials employed, some using vitrified clay pipe while most prefer cement pipes. The clay pipes are used very extensively where there is a clay pipe factory in the neighborhood. They are usually more expensive than cement pipes. In planning an underground pipe system there are some general principles which apply to all the different types.

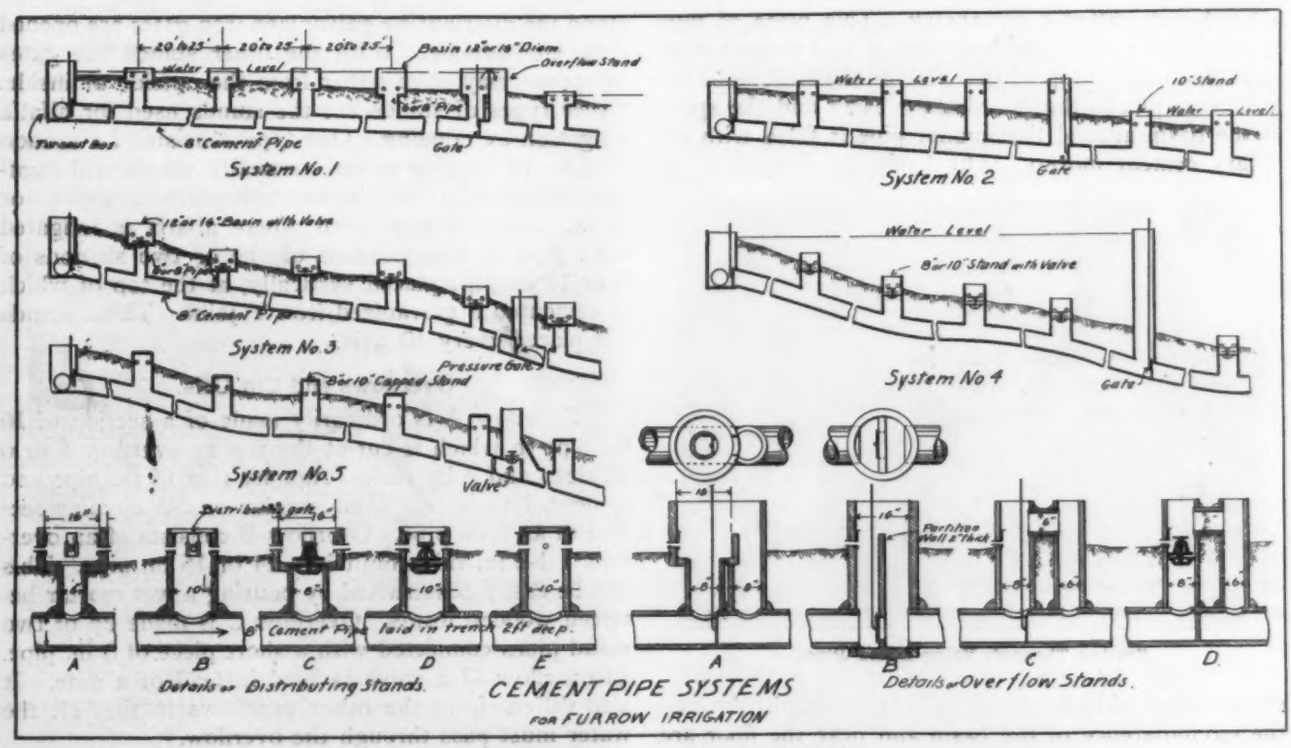
### Location.

The main line which carries the water from the measuring box to each line of stands is usually placed parallel to the direction of the furrows. The branches, on which are placed the stand pipes, are run at right angles to the main line. The number of laterals depends on the size of the field and on the length of the furrows, which varies with the character of the soil. the quantity of water handled, the irrigator, etc. As a rule the distance apart of laterals should not exceed 40 rods, or 660 ft., which measures the side of a 10 acre tract. A better distribution, especially on sandy soils, can be made by using furrows 330 ft. long. The slope of the furrows varies from 1 in. to 20 in. in 100 ft. For loamy soil a fall of 8 to 12 in. in 100 ft. is to be preferred. For gravelly soil a steeper slope is often used. The main line, when parallel to the furrows, has approximately the same slope as the furrows. It is usually located along one of the boundaries of the land. The lateral or line of stands usually at right angles to the furrows may have a very steep slope. For a small tract whose width is less than 660 ft., one line of standpipes leading from the measuring box is often all that is necessary.

### Different Systems and Placing of Stands.

Each stand is usually placed at the head and in line with the tree row. In this way little inconvenience is experienced in cultivating. The distance apart varies with the kind of trees; for orange orchards 20 to 25 ft. is common; for walnuts 40 to 60 ft.; for alfalfa 40 to 50 ft. There are a number of different types of stands. Some of the most common are illustrated. The methods of arranging stands and overflows or cut offs are numerous. A few typical examples of those used for orchard irrigation are given in the plate. Some of the details such as the types of stands and methods of arrangement and types of overflows have been patented and known as distinct systems.

Where the land is comparatively level and the line of stands on a flat grade the overflow system and Killar system are extensively used. For these two systems the top of the stands are placed on a level and the water rises in the stands, seeking its own level. Where the overflow system is employed the stands are seldom made over 16 in. above the ground. Where it exceeds this it is more economical to start a new section of stands by inserting a stop gate and overflow. The stop gate may be adjusted to allow part of the water to go down to the next stand. If this gate is not adjusted just right or if it is closed the water which is not distributed through the stands above passes over the overflow. On steep grade the cost is much increased because an overflow may be required at each stand. The Killar system does not provide an over-




Cement Pipe System for Furrow Irrigation.

flow, the regulation of flow depending entirely on the adjustment of the stop gates. On steep grade the stands must be several feet high or a large number of stop gates used. For steep grades one of the other systems may be preferable and more economical. In the types 3, 4 and 5 the water in the pipes is under pressure and is prevented from flowing over the stand by using regulating valves or by capping the top of the stand pipe with cement mortar. The cut off gates or orerflows are placed so as to regulate the pressure head, the line being divided into sections. The sections should be not larger than 600 ft. and the pressure head should not exceed 15 ft.

**Details of Stands—Construction.**

The common types of cement stands are shown in detail in the accompanying drawing. Stand A consists of a section of 6 or 8 in. pipe about 12 in. long,

Regulating the Valve in a Stand of a Cement Pipe System.

one end of which is cut out so as to saddle over a 6 or 8 in. hole which has been cut in the pipe line with a hand pick called a tomahawk. This piece of pipe is cemented to the pipe line with a 1 :2 cement mortar. Around the top of this pipe at the surface of the ground is placed the distributing basin and the space in the basin around the smaller pipe is filled with ordinary cement mortar. The basin consists of a cir-

Section Through Valve Stand Pipe.

cular section of 16 in. pipe 6 to 16 in. in length. Around the circumference of the basin and near the floor are from 4 to 6 galvanized iron distributing gates or spouts. These gates are set with cement mortar in holes which have been cut out as soon as the pipe has been made. If the pipe has hardened a pick or tomahawk is necessary. The water is distributed through the gates to the furrows. When the soil is such that the furrows will wash together a larger semi-circular basin is used. This basin is constructed with a special mould. Stand B consists of a single joint of 8 to 12 in. pipe cut to fit over a hole made in the distributing line. The distributing gates for the Killar system are usually placed at a given distance from the top (5 or 6 inches). Where the furrows will wash together the larger basins are better. Stands C, $C_1$ and D differ from stands $A_1$, $A_2$ and B in that a regulating valve is connected to the stand. Stand E consists of a single joint of pipe capped with cement. In this

Distributing Line With Distributing Basin at Head of Tree Rows.

stand the distributing galvanized iron gates are opened from the outside. With the other stands the gates or spouts may open either from the outside or inside. Other types of stands are the stands used for alfalfa irrigation by flooding. One type consists of a section of 8 or 10 in. pipe placed vertically which will regulate the flow. These stands are placed every 40 or 50 ft. Another type used where alfalfa is irrigated with pipe or hose consists of one or two sections of 8 or 10 in. pipe placed vertically, at the top of which is cemented a galvanized iron T joint. These stands are placed every 10 rods.

**Overflows and Cut Offs.**

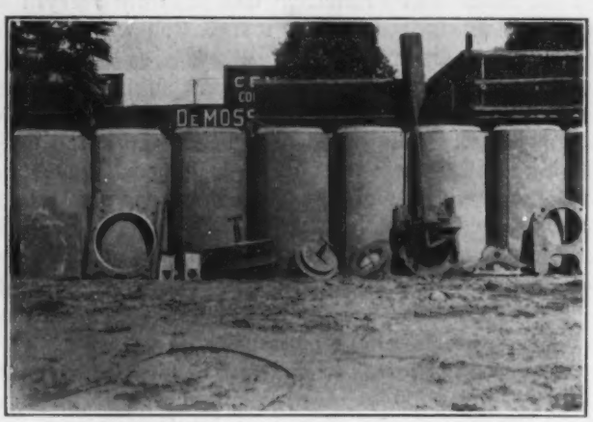
Overflow A is ordinarily made of a section of 16 in. pipe in which is cut at the top an overflow 5 or 6 in. deep and 7 in. wide. Against this 16 in. pipe and cemented to it is a semi-circular or 2-3 circular section of an 8 in. pipe. Overflow B consists of an overflow 1 1-2 in. thick built in a 14 or 16 in. pipe. This can be easily constructed by pouring a wet mortar between wooden forms. Overflow C is made up of two stand pipes connected with a short piece of 6 in. pipe. In overflow D a valve is used instead of a gate. It also differs from the other overflows in that all the water must pass through the overflow.

### Cut Offs or Turn Outs.

A cut off consists of a stand pipe in which one or more gates are used to regulate the quantity and direction of flow into two or more branches. If the water presses the gate against its frame, an ordinary slide gate, will be water tight. If the water pressure presses the gate away from its frame a pressure cut off gate is preferable to the ordinary slide gate which will leak. A pressure gate is a gate which through some mechanical device can be locked tight against the frame. This is usually accomplished by turning the handle which operates a lever, cam, geared wheels or other tightening device.

### Accessories.

1. Galvanized iron distributing gates or spouts which are made in different weights and of different shapes, either circular or oval. The light weight gates are used where the water presses the slide against the entrance to the spout and tends to keep the gate closed. The heavier weight is used where the water presses the gate away from the spout and tends to make it leak.



Cement Pipe and Accessories for Orchard Irrigation.

2. Cut off gates or stop gates, which are usually of two types: the cast iron or steel slidegate and the pressure gates described above.

3. The valves, which vary in detail according to the manufacturer. A good valve should be easily taken apart to remove leaves or twigs which may clog the stand.

### Placing of Accessories.

The galvanized iron distributing gates are placed in holes made in the distributing stands and cemented with mortar or neat cement. The holes being cut before the concrete has hardened, provided when making the pipe, or cut out with a sharp pick after the concrete has hardened. The cut-off gates and valves are cemented with mortar when placing the stands.

The attachments can be bought from the several manufacturers in Southern California at the prices given below.

**Cost of Galvanized Iron Distributing Gates or Spouts.**

| Size, diameter, inches. Round shape. | Light weight. Cents. | Heavy weight. Cents. |
|---|---|---|
| 1 | 4¾ | 7 |
| 1¼ | 5 | |
| 1½ | 5¼ | 10 |
| 2 | | 11 |
| Oval shape, equivalent to diameter. | | |
| 1 | | 10 |
| 2 | | 15 |

**Cost of Gates.**

| Cast Iron Slide Gates. Diameter of opening, inches. | Price. | Cast Iron Pressure Gates. Diameter of opening, inches. | Price. (List, three manufacturers). |
|---|---|---|---|
| 6 | $0.75—$0.85 | 6 | $2.25—$2.50—$3.00 |
| 8 | 1.05 | 8 | 3.00— 3.25— 4.25 |
| 10 | 1.75 | 10 | 3.50— 4.00— 5.00 |
| 12 | 2.50 | 12 | 4.25— 5.30— 6.00 |
| 14 | 3.00— 3.50 | 14 | 5.75— 7.25— 7.50 |
| 16 | 4.00— 4.75 | 16 | 9.50— 9.75 |
| 18 | 6.75 | 18 | 10.75—11.75 |
| 20 | 9.00 | 20 | 12.00—13.00 |

**Cost of Regulating Valves.**

| No. of Valve. | Size of opening. Inches. | Price. |
|---|---|---|
| 5 | 2.5 | $ .70 |
| 6 | 2.5 | .75 |
| 8 | 5 | .85 |
| 10 | 6 | 1.10 |
| 12 | 8 | 1.50 |
| 14 | 10 | 2.50 |

**Approximate Cost of Stands in Place.**

| Stand. | Price complete. |
|---|---|
| A | $1.00—$1.50 |
| B | .90— 1.25 |
| C | 1.75— 2.00 |
| D | 1.65 |
| E | 1.00 |
| Overflow | 2.75 + slide gate |

### Pressure Pipe Lines and Valves.

On some of the orchards in British Columbia and also on orchards in Idaho and Southern California, the water is distributed over the orchards in high pressure, wood-banded pipe lines. The pipe lines take the place of the head ditches; they are tapped at each row or wherever desired by a standpipe formed by screwing in the wood short sections of galvanized iron pipe capped by an ordinary garden valve to regulate the flow. Where the land is very irregular and it is desired to keep the water under pressure, this form of construction is the most desirable and in fact the only feasible one, but if it is possible to break the pressure and maintain it within the safe pressures for cement pipes by proper regulation, the cement pipe distributing system has the advantages of lower cost, greater durability and better division of the water between furrows.

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## DECISION REGARDING SAFETY OF ELECTRIC WIRING.

The supreme court of Washington recently held in the case of R. C. White against the Reservation Electric Company that the patrons of an electric company "have the right to presume that everything that is open to touch concerning the appliances by which electricity is conveyed, can be touched with safety." While working for the company White had arranged a contrivance of his own of levers and pulleys, to throw off and on. The evidence showed, however, that the proximate cause of the injury he suffered was the fact that the wires were carrying extraordinary heavy voltage, resulting in the shocking of numerous patrons. This fact led to the general statement of the dostrine held to apply under Washington laws.

---

**Electrification of the Canadian Pacific Railway** branch between Castlegar and Rossland is proposed. Direct current from the power plant at Bonnington Falls will be used, and the trains will be operated by large electric locomotives, securing the current from overhead wires. The section of the line to be electrified is 30 miles in length and has heavy grades and numerous curves.

## THE PROPER UTILIZATION OF LIGHT.

BY H. E. GRANT.

As illumination is an effect of which light is the cause, it is first accessory that we consider briefly the subject of light and in this way familiarize ourselves with the terms in which the subject of illumination and glare will be later discussed.

Even the ancients were familiar with some of the laws of light. For example, that we see an object in the direction in which it lies, and that it is impossible to see around a corner—and from this they arrived at the conclusion that light travels in straight lines from its source or from the object which it illuminates. Not only are we able to see objects because of the light reflected from them, but it is also interesting to note that no object has any inherent color of its own, but reflects a hue which is the sum of all the colors of the spectrum other than those it absorbs. The word "illuminate" means to decorate and we may truthfully say that illuminated objects are literally painted with light. As already indicated, white light is composed of all colors of the rainbow, and we see the rainbow when the white light of the sun is separated into its component parts which is accomplished through the law of refraction. So called colored objects, however, reflect their hue because of their power to absorb some of the colors of the spectrum and to reflect others.

That objects take their color from the light is readily illustrated when we place a red object under a light, such as that given by the Cooper-Hewitt mercury vapor lamp, in which there is no red ray, and under such lighting conditions the red object appears absolutely black. Material of the same color under say, gas light, the Mazda lamp, and carbon lamp, and the mercury vapor lamp would under each system appear altogether different.

One poet very aptly describes this law in a verse which reads:

"Colors are but phamtoms of the day,
With that they're born with that they fade away,
Like beauty's charms, they but amuse the sight,
Dark in themselves, till by reflection bright;
With the sun's aid, to rival him they boast,
But light withdraw, in their own shades are lost."

This suggests the necessity for careful selection of the light source if satisfactory illumination is to be secured.

Light is not necessarily split up into its component parts when it is refracted or bent. An experiment attributed to Bacon may be described in order to illustrate this, although you are all familiar with the fact that a stick thrust into the water at an angle, appears to be bent, and other illustrations of this law of refraction will also suggest themselves to you. The experiment of Bacon was to place a small coin in the bottom of a bowl and then to raise the bowl to such a level with the eye that the coin is just out of sight. By carefully pouring water into the bowl, without disturbing the coin, it nevertheless comes within the range of vision showing that the rays of light entering and leaving the water from the air, or in other words, passing from a medium of one density to that of another, are refracted or bent.

[1]Lecture before Alameda Electrical Development League, Oakland, California, August 30, 1913.

Light is said to be transmitted when it passes through an object more or less transparent. Whenever light is transmitted or reflected a loss in intensity occurs and this is referred to as absorption. Even in passing through the atmosphere the absorption of the sun's light is about 16 per cent.

Another law of light with which we are all familiar and which is too often too glibly quoted without reference to other circumstances affecting its accuracy is the so-called law of inverse squares—that light varies inversely as the square of the distance from its source. It would seem from such a statement that it is impossible to place a light unit, as a reflector and lamp is called, at different heights above the floor, or other reference plane, and still secure the same illumination, but we know that by using the proper reflector it is possible to place the unit, six feet, nine feet six inches, fifteen feet or at other proportionate mounting heights and yet still obtain the same intensity of illumination. This may be done by using various types of reflectors. I have used concentrating reflectors for auditorium lighting where the units were installed sixty feet high, and the resultant illumination was not only everything that could be desired but the installation was also economical in operation.

In speaking of the law of inverse squares we have mentioned the reference plane, or plane of illumination as it is usually designated, this being the plane upon which the illumination is figured; generally the surfaces upon which work is to be done such as tables, counters, desks, or the floor. The mounting height is the distance between the lighting unit and the floor.

Yesterday we designated the sizes of lamps by their candle power, today by the watts which they take, and tomorrow I believe that we shall ask for lamps giving so many lumens of light flux. The term "candle power," as applied to electric lamps was misleading. There are three ways of expressing the candle power of a lamp, and for their own advantage, some manufacturers were pleased to introduce a fourth. The candle power rating of incandescent electric lamps is the candle power given out by the lamp in a horizontal direction as measured when the lamp is revolving at approximately 120 revolutions per minute. The horizontal candle power is the greatest and is given off in the most useless direction. It is no indication of the total amount of light given by the lamp. In fact the distribution of light around bare light sources is almost invariably unsatisfactory, more light usually being thrown in other than useful directions. Where manufacturers, such as those of so-called gas arcs developed lighting units giving their maximum candle power perpendicularly this maximum candle power rating was given as the candle power of the lamp and candle power comparisons were drawn between that and the electric lamp on the basis of its horizontal candle power to the bewilderment of the uninitiated. The measurement of the lower hemispherical candle power was adopted by those manufacturers of lamps which threw practically no light above the horizontal and again comparisons with other lamps were made on an unfair basis. But lamps giving the same horizontal candle power or the same lower hemispherical candle power may on the other hand each give a total quantity of light which varies widely and as by the use

of properly designed equipment it is possible to utilize practically all of the light flux, as it is called, it is at once evident that the only strictly comparable method, or intelligent method of purchasing lamps even, is by stating the number of light units, or the light flux, generated by a lamp. Then without reference to efficiency, we shall be able to ask for exactly the "size" of lamp we require.

The quantity of light given off is expressed in lumens. A lumen of light flux is the quantity of flux-of-light required on a surface one foot square in order to give that surface an illumination of one foot-candle. Obviously, a foot-candle is the unit of intensity obtained at a distance of one foot from a light source of one candle power when the plane on which the illumination is considered is perpendicular to the light ray. The foot-candle is the unit of the intensity, of illumination. From our discussion so far we can readily see that a surface having an area of one square foot and receiving one lumen of light flux has an illumination of one foot-candle or one lumen per square foot. This shows that we can, if we wish, express illumination in terms of lumens per square foot instead of foot candles. The terms are in this sense, interchangeable.

If we have a given area and desire to obtain a given intensity over that area, we can easily determine the effective lumens, or quantity of light necessary to produce that intensity, by multiplying the area by the desired intensity, the product being the effective lumens. If we know the efficiency of the equipment to be used for redirecting the light into useful directions we can arrive quickly at the total light flux—lumens—or size of lamp required to secure the desired results.

This part of our subject is worth summarizing. Each lamp generates so many lumens. If the lamp is used without a reflector much of this flux-of-light is wasted on the upper part of walls and ceiling. The use of reflectors permits the redirection of much of this flux-of-light, otherwise lost, into a useful plane, but if the reflector is not scientifically designed, it becomes merely a shade absorbing the light and results in loss—inefficiency.

At this point I do not wish to be misconstrued. It is not to be supposed for one moment that I would advocate the use of reflectors for all light installations and consign the many beautiful shades to the limbs of oblivion. They have their uses, but it should be borne in mind that we pay for artistic or decorative appearance but the loss of efficiency may be entirely a mechanical loss. Here let me mention that the term efficiency is a loose term which has many applications and for this reason manufacturers' statements regarding the efficiency of the units which they manufacture are not always strictly comparable with those of other manufacturers. The visual efficiency of the resultant illumination is quite as important as the reflecting efficiency of the equipment as is the direction in which the light is projected.

We sometimes hear it stated that certain people use an oil lamp for reading because it is easier on the eyes. This is only comparatively true, for the comparison is usually made between a student's oil lamp and an inefficient electric lighting installation. Electric light may be so installed that it is incomparable, giving a sufficient quantity of illumination, economically, and eye ease or comfort in reading. Let us take second place to no competitive illuminant.

Used bare, as a light source is called which is not equipped with a shade or reflector, any light is not only undesirable but may be harmful, and the improper use of equipment is equally bad.

The co-operation of the incandescent lamp manufacturers has given us wonderfully efficient electric lamp bulbs, research and experimentation by the manufacturers of lighting equipment has produced shades and reflectors which permit the correct installation of these, but it is left to the co-operative effort of architects engineers, central stations, jobbers, fixture manufactures, and contractors, to see that these lamps and reflectors are so installed that the results will be satisfactory to all and so contribute toward the progress of the industry.

To be satisfactory a lighting installation must provide sufficient quantity of light, the necessary artistic effect or appearance, the proper quality of light, and the maximum of eye comfort, for the most important consideration in installations other than those used for scenic or spectacular effects is, that the ease with which we are able to see under an installation absolutely determines its value. Economy of maintenance and operation are important and often first cost a serious consideration, but if these prevent the installation of a system giving ocular comfort they should be eliminated as of no consequence. This often means considerable sales effort but is well worth while in the long run as it further popularizes the use of electric light and it was my experience as a central station sales manager, that the better the installation, the longer the hours it would be used and if with electric light, excellence and hours use is not the measure of increased business for all concerned, I would like to know what is.

We accept so much as a matter of course. Did we stop to consider we would realize somewhat the tremendously increased amount of work which we give our eyes to do as compared with what they had to do only twenty-five years ago. Electric light has turned night into day—has increased hours during which work is possible, lengthened the hours for study and pleasure—and we have not been slow to take advantage of this. Sometimes after an extra long session we drop back into a chair and our hands go up to our eyes as we close and rest them. Are we fair to ourselves and the community if we install lighting systems which are inefficient because of glare? What kind of illumination best contributes to eye comfort?

Quantity of illumination is important as already stated but it is true that within a very large range of intensity of illumination our vision is equally effective for all ordinary purposes. The reason for this is well-known. The iris of the eye, working rapidly and on the principle used in the diaphragm of a camera shutter, but automatically, adjusts itself to varying intensities, thus permitting greater or less amount of light to enter the eye from objects which are thus clearly seen. That we are able easily to read or work from sunrise to sunset, and then again under varying inten-

sities of artificial illumination, shows the remarkable range of the automatic adjustment of the iris of the eye. The light to which the eye is most habituated is daylight, which with its absence of pronounced color steadiness, downward direction, good diffusion, and therefore absence of pronounced shadows is the light which we must approximate if we are to secure the maximum eye comfort.

I was going to say, that one of the most glaring cases of glare is the automobile headlight which is inflicted upon all of us and which should be eliminated. I mention it here, to illustrate a point.

The adjustment of the iris of the eye is by no means instantaneous in action and the eye, after having been rested in darkness becomes very sensitive. A very low intensity of illumination is then sufficient to see by. The flinching and sometimes positive pain which we experience when the headlight flashes in our face is caused by too great an amount of light entering the eye and this light impinging on the retina leaves a pronounced image for a considerable period and causes eye fatigue. The iris adjusts itself with reference to the greatest intensity of light within the range of the eye and if an area is encountered which is of greater brilliance than the illumination intensity of the working plane the installation will be unsatisfactory, no matter to what extent the size of the lamps may be increased. We may state therefore that glaring light sources, or, glare, causes a depression of the visual function, which is characterized by the inability of the eye to distinguish fine detail and the more slight contrasts which are readily distinguished when the visual function is not depressed. The trouble occurs when depression of visual function causes eye strain which reacts upon other parts of the eye than those immediately affected.

The mere installation of an enclosing globe, giving good diffusion, about a too brilliant light source may or may not eliminate glare, depending entirely upon the background against which it is viewed. If the background be light, glare may be entirely eliminated, but if it be dark then glare will still obtain because of the contrast which exists. Similarly, contrast between brilliantly lighted ceilings and dark indirect bowls when these come within the range of vision is equally unsatisfactory and should be discouraged.

That light sources of great brilliancy or, contrasty installations, are annoying should be sufficient reason for their avoidance and that installations causing ocular discomfort may be positively injurious to eyesight should be sufficient argument to dissuade the most penurious customer from making a "cheap" inefficient lighting installation.

Correct lighting installations avoiding these objectionable features may be made simply by surrounding the lamp with a diffusing globe, or it may be surrounded by a deep reflector which does not show areas of high intrinsic brilliancy, or again, the light sources may be installed near the ceiling or at such heights that ordinarily they will not come within the range of vision. This last method, if the lamps are properly spaced and equipped with correctly designed reflectors, is the most satisfactory of all. The use of a diffusing globe is the least satisfactory.

For many conditions, semi-indirect units properly installed afford a very scientific and satisfactory solution, but a discussion along this line would at present take up too much time. Our subject must be kept within reasonable bounds and so for the present I will rest my case where it now stands. At any time in the future I shall be only too glad to elaborate upon any part of this general talk.

Correct illumination also calls for co-operation between the decorator, and the architect, and ourselves. You should welcome the architect to membership in your society, for the architect perhaps more than any other professional man, is able to bring about the realization of our ideal; raising standards of excellence both as regards materials and methods, harmonizing decorations and lighting system and emphasizing the artistic which we with our eye on the practical may be apt to forget. We need have no fear, in letting the architect take the lead in this matter for he is really one of us.

There are other conditions than those of glare which contribute to eye strain, but sufficient has been said—I believe—to arouse interest on this subject. The lighting of public buildings, window lighting, store lighting and the illumination of the home all call for the exercise of our care and consideration in eliminating this objectionable feature of glare from our lighting installations. The present widely adopted method of ornamental street lighting is a step in the right direction. The correction of lighting evils would mean tremendously increased business, and is worthy your most careful study and the application of your endeavor.

There is today nothing that can add more to the attractiveness and prosperity of your city, or contribute more to the success of its residents than such co-operative effort on your part. Take the one item of street car lighting alone where glaring light sources, which might be replaced with correct lighting installations, are the rule. The replacement of these would mean big business as also, for I can speak from experience, would be the re-designing along correct lines of the majority of store and store window lighting installations. And so we might go on.

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**The report of Washington's state tax commission** shows that 25 of the 39 counties in the state have no electric lines. The remaining fourteen counties have a total of 922.89 miles valued at $48,428,890 with an assessed valuation of $21,505,299.

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**The Saskatchewan government telephone system** in the Canadian Province of that name expended $1,526,755.95 during the year ending February 28, 1913. The gross income amounted to $392,393.17. During the year construction has been done as follows: New toll offices, 46; new exchanges, 34; pole miles, long distance, 516.22; wire miles, long distance, 3766.8 and service was extended to 4,288 new subscribers during the year, making a total of 9,850 subscribers now being served. The telephone situation in this great grain growing province at the present date shows 251 rural telephone companies, 22 independent companies, 5 municipal telephone systems in addition to the government system.

## INTEGRITY AND "ELECTRIC" ADVERTISING.

BY R. E. HOLLIDAY.

The undisputed efficiency of the electric sign as an advertising medium has developed that industry to such an extent that it is today a real science and experts are devoting their whole time and ability to produce by plaster effect and color combinations such results as make for individuality and originality, the key note of successful advertising. This applies more especially to roof and other spectacular display signs although we find more attention has latterly been given to the smaller type of signs, those used by the retail merchant and it is in regard to this smaller class of sign that the writer has reference.

As one walks through the main streets of any large city wherein electric signs are allowed to project over the sidewalk the thought invariably comes "what a jumble." There is much light to be sure, a splendid thing for the streets and its people, and great protection, too, but where is the art? Where symmetry? Where the advertising value of each merchant's sign? All gone. Even if one or all existed. Such results are brought about by the lack of integrity in the average sign salesman. His first and last thought is, "get the order." No thought is apparently given either to original design, nor flashing effect and certainly no consideration is given to the location of the sign, when hung. Thus the chaotic day and night aspect of our streets, so also is the value of the advertising reduced to nil, hardly is it worth the merchants' while to operate this sign, let alone the fact that he gets no returns for investment herein.

If the sign salesman would cultivate just a little integrity, common, ordinary honesty, in his dealings with the buyer a great change would result. Our streets could be made truly artistic, the merchant could retain his identity, the city authorities would be glad to help in many more ways than they do now, and it would considerably lessen the tendency to legislate against this particular class of signs.

The sign manufacturers themselves should pay very much closer attention to this matter. By employing only such salesmen whose knowledge of what can and cannot be done by an electric sign will preclude the selling to merchants of something that becomes an eyesore and detriment, not only to the street's appearance, but to the selling company's repute, they will materially raise the standard of the smaller branch of electric advertising.

The time is drawing near when city authorities will sicken at the lack of effort along these lines and will drastically legislate against sidewalk electric signs and the sign manufacturers will have only their indifference to these vital issues to blame. Another most important question and one too that shows a lack of integrity both on the part of salesmen and manufacturers is the attempt to "put something over" on either the city inspectors or other authorities responsible for proper ordinances or rules for electric installations. A determination to work in accord and entirely up to those rules and codes extant will help the persons responsible for proper and safe installations and again raise the standard of our business. Let us adopt the slogan, Electrical Integrity.

## WINDMILLS FOR GENERATING ELECTRICITY.

The principal component of a windmill is the wheel, the spindle of which is turned parallel to the direction of the prevailing wind (by a guide vane), in order that all blades may work uniformly. To avoid wasteful eddy currents, the blades should not be too close together, and should not extend to the centre of the wheel. The following table shows the horsepower which can theoretically be realized from a 28 foot wheel exposed to winds of various velocities:

| Speed of wind, M.P.H. | H.P. | Speed of wind, M.P.H. | H.P. |
|---|---|---|---|
| 2.25 | 0.04 | 22.5 | 40 |
| 6.7 | 1.1 | 33.5 | 135 |
| 11.2 | 5.0 | 45.0 | 520 |
| 15.7 | 13.0 | 67.0 | 1,080 |

The power available should increase with the cube of the wind velocity (since the kinetic energy of the air particles increases with the square of their velocity and the number of them striking the wheel blades per second increases in direct proportion to the wind velocity). It is not practicable to construct a mill which will utilize with equal efficiency a light breeze and a strong wind, hence the curvature and setting of the blades should be such that the mill works most efficiently when exposed to a wind of the velocity generally prevailing in the district concerned. If a wheel be designed to utilize with maximum efficiency a wind of 22.5 m.p.h., it will not run in a 7 m.p.h. breeze, since the power corresponding to this wind is less than the power required to overcome the light load losses of the wheel and its gearing. Breezes of 8 to 15 m.p.h. are much more common than 20 m.p.h. winds, hence it is generally advisable to employ, for driving lighting or other dynamos, a very light wheel which will start work in a 3.5 m.p.h. wind, and which can still be used when the wind rises to 10 m.p.h. Such a wheel could not be exposed fully to a 30 m.p.h. wind, and for safety a device should be mounted on the main wheel, so that when the wind pressure exceeds a certain limit, the inclination of the blades is changed, against the control of a spring, in such a manner as to reduce the effective area exposed to the wind. The control springs may conveniently be set so that they come into operation when the wind velocity exceeds 16 m.p.h., and so that the output of the mill is constant in winds above 18 m.p.h.; there is thus secured maximum total annual output. Dynamos employed with windmills should not be excited from the battery, since the voltage of the latter may be very low after a long period of calm weather. The automatic main dynamo switch should operate when the machine voltage just equals that of the batteries, and mercury contacts should not be used.

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**To detect carbon monoxide** in the atmosphere the "toximeter" has been invented by a Frenchman named Guasco. When this gas is absorbed by platinum sponge the platinum becomes rapidly heated. This rise in temperature can be shown by a differential thermometer which can be graduated to show the presence of one ten-thousandth part of the gas.

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### The Hazard of Centralization

The development of the electrical industry has been characterized by a gradual process of centralization. Smaller plants have been combined into larger systems, and the whole interconnected by a great network, whereby both physical and financial control is brought to one center. The system acquires the compact vigor of one man, great economics are effected and increased efficiency is gained. Better results are attained by fixing definite responsibility. Within certain limits this plan promises to work admirably and may benefit the industry.

But these benefits may be offset by corresponding disadvantages which should be anticipated and guarded against. To concentrate confidence in the hands of a few men whose whims may waver with the wind does not provide a sufficient factor of safety. Where political power has been so placed in the past great abuses have crept into the body politic. History is a stern and inexorable judge whose facts seem sterile except to those who under the bare fact see the soul of the fact. If men in the past have revolted against one-man political power are they not as liable to chafe under too great centralization of utility control?

For example a water company supplying a great area would be wise in delivering water only to the limits of each town, rather than to the individual consumers. Separate ownership and management of distributing plants and systems would be of greater benefit to each community. The same is true of any other public utility. The recent strike in the silk mills of Massachusetts is said to be largely due to an absent ownership which prevents a sympathetic understanding of local needs. The peril of centralization lies not at the center but at the circumference.

Centralization is frequently advocated because it leads towards standardization. This, however, is not an unmixed blessing. When methods are so standardized that no change can be made progress is killed and the industry will stagnate. An iron-clad policy and a stereotyped plan of procedure cannot be made universally applicable nor can one central office intelligently regulate all details in outlying communities.

Comparative isolation of electric distributing systems would eliminate much damage from strikers, for each community would be far more interested in their restraint than where the responsibility rests with some central and distinct office. The great danger of a unified electric system is that the management will not keep in touch with the various individual communities. The present central station system does not give the personal and prompt attention to requests and complaints that is necessary to maintain a favorable public opinion. Each locality and each consumer in each locality has certain peculiarities which demand specialized attention. When a system covers a large area and serves many small towns it is difficult to

maintain the close relationship with municipal governing bodies and individual customers which contributes greatly to the financial success of the company.

---

**Electric Mine Hoisting**

It is only a few years since the difficulty of controlling the speed of the alternating current motor made it of secondary consideration to the direct current type for mine hoisting purposes. In these few years such great strides have been made that now almost any type of electric motor can be used for mine hoisting because the ingenuity of the designing engineer has provided some apparatus for controlling it.

In the modern mine installations along the Mother Lode of California the old form of drum controller made familiar by the electric railway is a thing of the past, largely because of the more exacting requirements of this form of transportation. The operator of an elevator or street car is always stationed on the moving car, whereas in mine hoisting he is stationed at the mouth of the shaft and sees the car only at the end of the trip. Great variation in speed is necessary, yet it must be always under absolute control. To meet these requirements two general methods have been devised, the rheostatic and the varying voltage, the one varying the current and the other the voltage of the motion. As the former is simpler, though less precise, it has been adopted in a majority of cases.

The speed is controlled by varying the resistance in the secondary circuit of the polyphase motor, reversal being accomplished by interchanging two of the primary leads. For the large motors used on the Mother Lode the circuits are broken by means of magnetic contactor panels operated from a master controller on the engineer's platform, so that only the low amperage necessary in magnetizing the contactor coils pass through the master controller.

While electric hoisting is perhaps the most important single contribution of electricity to mining, its other advantages of convenience and economy, its flexibility and efficiency, its capability of transmission and its universality of application, is fast giving it preeminence over steam, hydraulic and compressed air power for other phases of mine service. Closely allied to hoisting is under ground tramming, for which electric traction is well suited as a substitute for mule or man power.

Aside from these problems of the transportation of ore, mining engineers are much concerned in the economical handling of water to be removed from and air to be admitted to underground works. There are few mines where constant pumping is not necessary to prevent flooding and continual effort not being made to provide good ventilation. Natural means are employed so far as possible, but where gravity is unfavorable, electricity is readily available. For handling water reciprocating or centrifugal pumps are efficiently and conveniently driven by electric motors. The high head multi-stage turbine pump can now be made to lift to a head of two thousand feet. It is a moot question, however, whether it is not more advisable to have the stages in the shaft rather than in the pump. The manifold advantages of an electric driven ventilating fan are causing its introduction into mining work. Electric drive of air compressors is also proving satisfactory in supplying power for drilling, though a practical electric drill has also at last been devised.

For ages the miner has groped his uncertain way through drifts and stopes by the light of a flickering candle or an ill-smelling oil lamp. Extinguished by a breath it plunged the bearer into total darkness with great danger of a further plunge into an unguarded winze. Today there are but few stations and levels in a modern mine that are not electrically lighted. As a consequence the work is better done and the miners' health better preserved. For portable use the storage battery tungsten lamp is also becoming a valuable means of exploring dark underground recesses.

The mine telephone, giving direct and instant communication from the most remote workings to the surface, is of untold convenience, as is also flashlight signaling by interrupting the current passing through the incandescent lamps, which is replacing the time-honored bell and cord.

Passing from the underground workings to the surface we find electric timber-framers and machine tools doing better work in less time than can be accomplished by hand labor. The blacksmith may use an electric drill sharpener and harden his drills to an exact nicety in an electric tempering furnace. In the mill individual motor drive of crushers, stamps and concentrators does away with unsightly and cumbersome shafting and belting, together with its attendant inefficiency: The magnetic and electrostatic properties of certain minerals makes possible their separation from the gangue and thus concentrates them for other treatment.

In metallurgical work electricity is daily increasing in value. The latest practice in the chlorination process is to produce the chlorine by electrolysis. This method has been adopted and is in everyday use in the United States Mint, as is also the electrolytic deposition of gold and silver from their solutions. In the cyanide process, bright minds are now at work on this same problem.

The greatest opportunity for metallurgical work is the adaptation of the tremendous heat of the electric current to the smelting of ores. This is already in successful use in treating iron and zinc and, with increasing cost of fuel and decreasing cost of electric current, will soon be applied to the other metals. So rapidly are the manifold advantages of electricity being applied to every department of mining work that a knowledge of the principles of electricity will be as indispensable to a mining engineer as is an understanding of chemistry and geology.

# PERSONALS

ITEMS FOR THIS DEPARTMENT ARE SOLICITED FROM ALL READERS

**Thos. Finnigan,** vice-president of Pierson, Roeding & Co., is at Los Angeles.

**O. B. Penrose** of the Fobes Supply Company, Seattle, was in San Francisco during the past week.

**H. N. Lauritzen,** Pacific Coast manager for the Holophane Works of the General Electric Company, is at Los Angeles.

**C. E. Dunbar** of the Western States Gas & Electric Company, Stockton, is spending the week in San Francisco on his vacation.

**R. Worth,** northwest branch manager American Ever Ready Company, spent a few days in Vancouver, B. C., last week on company business.

**R. E. Briggs,** of Gill & Company, manufacturers of illuminating glassware at Steubenville, Ohio, is expected at San Francisco this week.

**H. M. Ferguson** has succeeded **J. F. Derge** as manager of the commercial department of the Missoula Light & Water Company at Missoula, Mont.

**H. L. Eicher,** acting manager Fort Wayne Electric Works of the General Electric Company, Seattle, is spending his vacation in northern Washington.

**Geo. C. Holberton,** manager Pacific Gas & Electric Company, San Francisco, left the latter part of last week for an extended trip through the East.

**M. L. Scobey,** salesman with the Pacific States Electric Company, San Francisco, has returned after a three weeks' trip through Southern California.

**J. H. Hornung,** formerly associated with the Great Western Power Company, has become manager of the San Francisco, Napa & Calistoga Railway.

**A. L. Thorn,** deputy manager Tacoma light department recently returned from a two weeks' business and pleasure trip to the Coos Bay country in Oregon.

**E. M. Cutting,** manager Edison Storage Battery Supply Company, returned the first part of the week from an extended trip through Oregon and Washington.

**M. F. Steele** of the Benjamin Electric Company, San Francisco, returned the latter part of the week from a several days' trip to Los Angeles and Southern California.

**W. W. Briggs,** manager Great Western Power Company, San Francisco, left the latter part of the week on a business trip to Sacramento and the Sacramento Valley, California.

**B. W. Mendenhall,** commercial agent for the Utah Light & Railway Company, of Salt Lake City, is attending the Seattle convention of the N. W. Electric Light & Power Association.

**H. J. Mitchell,** formerly associated with E. P. Jamison & Company, Seattle, has resigned from that concern to accept the agency of the Edison Storage Battery Supply Company at that city.

**C. E. White,** manager of the Montgomery (Ala.) Light & Water Power Company, has been appointed the delegate of the Southern Gas Association, of which he is past president, to represent it at the International Gas Congress at San Francisco in 1915.

**G. J. Desharats,** deputy minister of marine, has completed an inspection trip of all wireless stations on the western coast of Canada. The revenue from the wireless stations has been on the steady increase since their inauguration by the Canadian government.

**W. H. P. Hill,** formerly manager of the Santa Rosa District of the Great Western Power Company, has been placed in charge of the Sacramento district with headquarters at Sacramento. **B. M. Levy** of the same company has been appointed manager of the Santa Rosa district.

**George R. Murphy,** manager of the storage battery department of Pierson, Roeding & Company, is at Seattle, where he will attend the convention of the Northwest Electric Light & Power Association. He will also be present at the Pacific Coast convention of the American Institute of Electrical Engineers at Vancouver next week.

**A. L. Havens,** for the past five years manager of the Los Angeles office of Pierson, Roeding & Co., has resigned, and **R. H. Husbands** has been appointed his successor. Mr. Havens' private interests have assumed such large proportions in the Southwest that he finds it necessary to devote his entire time to those interests. The business of Pierson, Roeding & Co. in the Southwest has flourished under Mr. Havens' able management, and his many friends regret that he is to no longer be actively associated in the electrical field. Mr. Husbands, who assumes the position as manager, was for six years manager of Pierson, Roeding & Co.'s Seattle office. He is thoroughly conversant with the company's business, and will, no doubt, continue the successful work inaugurated by Mr. Havens.

## ELECTRICAL JOBBERS' MEETING.

The Pacific Coast electrical jobbers will meet at Gearhart, near Portland, Ore., on September 18-20. A special car will leave San Francisco on train No. 16, at 8:20 p. m., September 16. F. N. Averill, Fobes Supply Company, Portland, is chairman of the local committee of arrangements.

## SAN FRANCISCO ELECTRICAL DEVELOPMENT AND JOVIAN LEAGUE.

Last Tuesday's meeting was the opening meeting of the new term, the League having taken a two months' vacation during the summer. Mr. W. F. Neiman, vice-president, presided, President W. S. Berry being absent on a business trip in the East. After an opening address of welcome by Mr. H. V. Carter, the speaker of the day, Robert Newton Lynch, vice-president and manager of the San Francisco Chamber of Commerce, was introduced. Mr. Lynch took for his subject co-operation among various public bodies and concentration by each upon some particular and definite line of operation and sticking to the same until the object has been accomplished. The address was most interesting and instructive, Mr. Lynch detailing some of the work before the Chamber of Commerce and how it was hoped to be accomplished through the plan of concentration. A hearty vote of thanks was given the speaker by the fifty or more members present.

## OREGON SOCIETY OF ENGINEERS.

The report of the Committee on Engineering Education, D. C. Henry, chairman, of the Oregon Society of Engineers, on the proposed action of the Board of Higher Curricula, State of Oregon, seeking the elimination of duplicate courses of study in the Oregon State University and the State Agricultural College, and confining the engineering course to the State University entirely, was presented before the latter body, August 5th.

The conclusions upon which the report is based were arrived at after answers were received to a series of questions on the subject submitted to eminent engineering authorities in various branches of the service in different parts of the United States as follows:

1. We believe that the engineering courses should be left in the university as they are at present, until, more complete study of the problem can be made, or until the question of a combination of the two schools is settled.

2. If a change is made, practically all engineering should be placed in the university.

3. The entrance requirements should be high.

4. Oregon should plan for a future when the state will have a large population and great wealth. At present her population is small and she cannot expect to support such schools as some of her neighbors maintain.

There is considerable probability that a student who does attend school in another state will secure employment there after graduation, and in a sense be lost to his own state.

5. In conclusion we desire to have it understood that our motive is to aid in the right solution of this significant problem. We consider the work of the university and the agricultural college of equal importance to the state, and will give our hearty support to both, either as separate schools or in combination.

The Oregon Society of Engineers has been asked through its committee, to prepare suggestions for a suitable curriculum leading to the degree of engineer, which will probably come up at the December 2d meeting of the Board of Higher Curricula.

## NEWS OF CALIFORNIA RAILROAD COMMISSION.

The commission issued a supplemental order authorizing the San Diego Consolidated Gas & Electric Company, to issue $33,000 of its 5 per cent bonds at not less than 85.

A decision was rendered authorizing the Midway Gas Company to issue $75,000 of promissory notes for the purpose of refunding notes held by the Bank of California.

A decision was rendered permitting the Southern California Edison Company to pledge its 5 per cent bonds of the value of $400,000 for the purpose of making extensions to its system.

## TRADE NOTES.

The Tacoma Electrical Machinery Company, Tacoma, is installing a 20 h.p. Allis-Chalmers motor at the plant of the Tacoma Boiler Works.

The Fort Wayne Electric Works of the General Electric Company, Seattle office, has sold to the city of Sumas, Washington, $500 worth of meters.

The Allis-Chalmers Manufacturing Company, San Francisco, has sold to the Fresno Traction Company, two 600 kw. motor generator sets.

The St. Paul & Tacoma Lumber Company, Tacoma, has put into operation its recently installed 1000 kw. turbo generator plant. This is to be used in operating its planing mill.

The Pacific Electric Manufacturing Company, San Francisco, has shipped to the Pacific Light & Power Corporation, Los Angeles, six 60,000 volt pole top switches of the Baum type.

The American Engine & Electric Company, Bound Brook, N. J., has taken over the business of the American Engine Company and will manufacture high speed steam engines and a complete line of motors and generators.

A shipment of hydraulic machinery from the Joshua Hendy Iron Works, San Francisco, to the Alaska-Gastineau Mining Company, Juneau, Alaska, was lost in transit in a storm on the coast and the entire equipment is being duplicated.

On the application of the Chicago Title & Trust Company and W. E. Rieley the superior court of Ferry county, Washington, appointed Warren W. Tollman, an attorney of Spokane, receiver for the North Washington Power & Reduction Company.

Charles C. Moore & Company, San Francisco, have closed a contract with the U. S. Reclamation Service for five 50-inch Plat Iron Works centrifugal pumps. One 50, two 36 and three 26-inch pumps of this type have been contracted for by the Solano Irrigated Farms.

The Edison Storage Battery Supply Company is installing a complete emergency lighting plant on the private yacht of D. C. Jackling under construction at Seattle, Wash. When completed the plant will consist of 100 cells of A-6 Edison batteries and have a 225 ampere hour capacity.

The Inland Empire Paper Company, Spokane, will install three 1000 kw. oil insulated water cooled Allis-Chalmers transformers. These will be used to reduce the 60,000 volts line current of the Spokane Inland Railway Company's current to 440 volts service for driving various motors.

The Puget Sound Traction, Light & Power Company have recently purchased a 1000 lb. and a 3½ ton truck, both equipped with Edison storage batteries for use in their service work at Seattle and another truck equipped with Edison batteries is on the way from the East to their station at Tacoma.

The Edison Storage Battery Supply Company is to have a complete house lighting plant on exhibition at the coming State Fair to be held at Sacramento, September 13th to 20th, inclusive, and will light their booth from their own plant, as well as make several other demonstrations with Edison storage batteries.

The Reynolds Electric Company, Seattle, has sold a 50 h.p. two-phase, 2300-volt motor to the Barber Asphalt Company, a 20 h.p. two-phase induction motor to the Eagle Laundry Company, and is installing same. The company is also repairing the 650 h.p. motor of Lewis, Wiley & Morse, Inc., hydraulic engineers and contractors.

Albert Kelley, a steel contractor of Seattle has closed a contract with the Pelton Water-wheel Company of New York and San Francisco, to install for the Vancouver Island Power Company, two miles of welded steel pressure pipe, ranging from 48 in. to 54 in. in diameter. The pipe is for the hydroelectric plant of the company, and it is to be laid along the Jordan River some forty-six miles from Victoria. The work is to start on September 1st and to be completed in ninety days. This line is planned to add 25,000 horsepower to the present capacity of the plant.

## ENGINEERING LIBRARY FOR TECHNICAL SOCIETY OF PACIFIC COAST.

The Technical Society of the Pacific Coast has been requested by the librarian of the Mechanics Institute to help him in the preparation of a list of books, periodicals, magazines and publications, to be referred to and to be consulted in the formation of a good engineering reference library, which has been a want long felt by the engineering professions in and about San Francisco.

To that end the president of the Technical Society of the Pacific Coast has appointed a committee to formulate a plan, by which the ideas of members of different technical organizations having local branches could be obtained, compiled and submitted for the purpose above indicated.

The committee thinks that the best way of arriving at the desired result is to instruct the secretaries of the local societies to include in their usual notices to members a circular letter, setting forth the above information, and asking each member to submit, at the earliest possible date, a list of such publications as he may deem desirable from his own standpoint, and from the standpoint of those whom he knows to be interested in the particular subject that he may represent or have in mind.

It is contemplated to obtain or compile a complete index system, by means of which all the articles relating to a particular branch or subject may be easily found with the expenditure of a minimum of time and effort.

As a library of the character contemplated will be of great value to the engineering professions, the co-operation of all engineers interested is urgently desired and requested, in order to make the list as complete and universal as possible.

Suggested lists, properly classified as to the engineering branches involved, should be addressed to the Engineering Reference Library Committee, care Otto von Geldern, secretary, 865 Pacific building, San Francisco.

# THE ELECTRICAL CONTRACTORS' DEPARTMENT

## REQUIREMENTS FOR ELECTRIC SERVICE AT PANAMA-PACIFIC INTERNATIONAL EXPOSITION.

(Concluded)

Service cabinets or fuse boxes for consumers purchasing energy on a flat-rate basis need be only of sufficient size to accommodate the service fuses. Said cabinets or boxes to be provided with fastenings to permit sealing the box.

The sealed service fuses when blown will be replaced by the exposition at the expense of the consumer.

All d.c. motors and all a.c. motors of 5 h.p. and over shall have their starting devices fitted with a no-voltage release.

Consumers having a 120-volt connected load to any one service of over 2 kw. shall have their installation wired for a three-wire service.

Participants shall install, where directed, such electric and gas lights for exit and patrol purposes as the director of works may require for public safety.

The decorative lighting installed by participants shall be subject to the approval of the director of works and no installation will be permitted which is out of harmony with the general lighting scheme or in any way causes inconvenience or disadvantage to other participants.

Light sources of great intrinsic brilliancy shall be fitted with suitable globes or reflectors or so placed as not to cause a disagreeable effect upon the eyes.

In case of failure of a meter to register properly or in case the meter seal has been broken, the consumer shall be liable for an average bill. Meters will te tested at regular intervals and the consumer may have access to the records of such tests. Any consumer may demand a test of his meter by depositing $3.00 with the exposition, and if the meter is found on test to be accurate within 2 per cent, said deposit will be forfeited, but if the meter is in error more than 2 per cent said deposit will be returned to the consumer. If the test shows that the meter is more than 2 per cent fast, the consumer will be refunded an amount sufficient to cover the error in excess of 2 per cent for the two months preceding the test, but if the test shows the meter to be more than 2 per cent slow, the consumer shall pay to the exposition an amount sufficient to cover the error in excess of 2 per cent for the two months preceding the test.

Electric service will be furnished at flat rates, meter rates and special rates, as follows:

Electrical installation having a connected load to any given kind of service of less than 2 kilowatts will be charged for service at a flat rate of $15.00 per calendar month per kilowatt of connected load, payable in advance. If the connected load is 166 watts or less the rate will $2.50 per month, payable in advance. The foregoing rate is based on the entire connected load being used not more than 56 hours per week, and if upon test the current consumption is found to be greater, the rate will be increased proportionately, or, if the director of works so decides, the flat rate will be discontinued and the consumer served through a meter at meter rates.

The connected load is to be determined by adding together the capacities of the lamps, apparatus and appliances connected to any one given kind of service, and the capacity of any lamp, piece of apparatus or appliance will be taken as that of the manufacturer's rating marked thereon; or by test made by the director of works. In estimating the connected load one h.p. will be considered equivalent to 750 watts.

Electric service to consumers having a connected load of 2 kw. and over for any given kind of service, will be measured by meters which will be installed and maintained by the exposition.

The rates for electric service measured by meters will be based upon the size of the consumer's connected load and the amount of energy used per month. The connected load will be determined by adding together the capacities of all lamps, apparatus and appliances served through any one meter. The capacity of lamps, apparatus and appliances will be taken from the manufacturer's rating marked thereon or the director of works may test any lamp, piece of apparatus or appliance to determine its capacity. In estimating the connected load, one h.p. will be taken as equivalent to 750 watts.

The connected load and rate charged shall be figured separately for each kind of service furnished, and in no case shall the consumer's rate be determined by any combination of the connected loads or current consumption of different kinds of service.

For electric service on a meter basis, the consumer shall pay a charge of $2.50 per month per kw. of connected load, and in addition thereto shall pay for the energy consumed at the following rates:

Five cents per kw.-hr. if the monthly consumption is less than 1000 kw.-hr.

If the consumption per month is 1000 kw.-hr. or more, but not in excess of 20,000 kw.-hr., the rate of 5c will be reduced 1/10c for each 1000 kw.-hr. consumed.

For a monthly consumption exceeding 20,000 kw.-hr. the rate will be 3c per kw.-hr.

A month will be considered as the interval between meter readings, which will be taken as nearly as it is convenient on the same date of each calendar month.

Exhibitors so located that they will not require electric service except during the daylight hours that the exposition buildings are open to the general public will be given service rates at 25 per cent less than the foregoing flat and meter rates. Exhibitors requiring electric service to operate moving machinery will be charged only for the energy, at the rate of 3 cents per kilowatt.

## NEW CATALOGUES.

The Cutler-Hammer Manufacturing Company, Milwaukee, has printed a new edition of Bulletin 8540, dated August, 1913, which supersedes the former bulletin of the same number dated January, 1912. This new 24-page bulletin contains prices and data on the various types of battery charging rheostats for both lead and Edison cell batteries, including wall, floor and switchboard types.

## BOOK REVIEW.

**Factory Lighting.** By Clarence E. Clewell; 161 pages; 6x9; 100 illustrations; cloth. Published by McGraw, Hill Book Co., New York City, and for sale by Technical Book Shop, San Francisco. Price $2.00.

Industrial Electric Lighting would be a more appropriate name to designate the scope of this work which covers many lighting requirements besides those of the factory, but which is limited to electric illumination. While general principles are well defined in the opening chapters, the chief emphasis is placed upon the specific requirements of a particular type to be adopted as a model for similar installations. Chapters are devoted to the proper design, to practical wiring and to methods of caring for an installation. The proper lighting of an office, a drafting room, factory, power house, steel mill and machine tools is thoroughly discussed. The underlying thought throughout is the selection of a lighting system which will increase the efficiency of workmen and as such it forms a valuable addition to the wealth of literature on this subject.

# NEWS NOTES

## INCORPORATIONS.

OCEANSIDE, CAL.—Articles of incorporation of Pamoosa Falls Land & Water Company have been filed with a capital stock of $100,000. The directors are C. B. Kinkead of Pala Alto, N. D. Kinkead of Escondido, and Wm. Kinkead of Moosa. The incorporators, who own property in Moosa conyon propose to develop water for application on their lands along Moosa creek.

LOS ANGELES, CAL.—Definite announcement has been made by T. E. Gibbon of a project for which funds are in sight, to build a railroad from Los Angeles to a point in lower San Joaquin Valley. It will parallel in a general way the route of the state highway through Tejon pass, and will serve as direct connecting links between the oil fields and Los Angeles. Articles of incorporation of the San Joaquin Valley & Los Angeles Railway Company, which is to build the road, have been filed, with a capitalization of $3,000,000. The incorporators are T. E. Gibbon, W. C. Shuleton, J. E. Stephens, J. E. Shuleton and J. R. Colburn.

## ILLUMINATION.

KLAMATH FALLS, ORE.—A movement is on foot here for city ownership of the light, power and water systems.

COMPTON, CAL.—Sealed bids will be received up to October 7th, for a franchise granting the right to construct and operate an electric pole and wire system in this city.

SAN FRANCISCO, CAL.—The Universal Electric & Gas Company, is seeking permission from the supervisors to extend its pipe and conduit system to all parts of the city.

TACOMA, WASH.—Superintendent B. W. Collins, light and power department, will soon have data ready in reference to the establishment of a lighting system on A street, Pacific avenue, Commerce and C streets.

LOS ANGELES, CAL.—Sealed bids will be received up to September 8th by the board of supervisors of Los Angeles county, for installing and maintaining a system of street lighting in Westgate lighting district.

LOS ANGELES, CAL.—Sealed bids will be received up to September 8th, by the board of supervisors of Los Angeles county, for installing and maintaining an addition to the system of street lighting in Bairdstown lighting district.

GLENDALE, CAL.—The contract for the installation of a street lighting system in Casa Verdugo has been awarded to the electric light department of the city of Glendale, by the county board of supervisors. The contract price for the installation of the system is $10,000.

PORTLAND, ORE.—Disputed light and power rates in 17 cities of Oregon, including Portland, Oregon City, Salem, Mt. Angel and Woodburn, will come before the Oregon Railroad Commission for adjustment at a hearing in Portland on September 2d. This hearing will also have an important bearing on the proposed six-tickets-for-a-quarter street car fare ordinance in Portland. Though this issue will not come before the commission officially at that time, every element of the controversy between the city and the Portland Railway, Light & Power Company as to the fairness of such a rate, except an actual ruling on it, will be involved. The way will be opened either for the city commission or any three citizens, by making a formal complaint against present fares, to bring the question before the state commission for a ruling later. By direction of the commission, the Portland Railway, Light & Power Company is to have ready by September 1 a complete appraisement of all its properties.

## TRANSMISSION.

VALE, ORE.—The Beaver River Power Company state that arrangements have been made for immediate construction of high tension line to Vale.

BOISE, IDAHO.—The Ashton & St. Anthony Power Company, capitalized for $250,000, petitioned the utilities commission for a certificate of convenience and necessity to dam north fork of Snake River, two miles west of Ashton.

TACOMA, WASH.—The Tacoma Railway & Power Company has obtained options upon property at Twelfth and Sprague streets, where the management intends to erect a new power house, storage sheds and headquarters offices.

PRESCOTT, ARIZ.—With a view to utilizing the power of Cataract Canyon, the Cataract Canyon Power Company has given an option to J. Barton Nealey, who is associated with capitalists of Bangor, Maine, who will have surveys made and will obtain other accurate data with a view to forwarding the project.

VICTORIA, B. C.—Notice has been given that the British-Pacific Hydroelectric & Tramway Ltd. of Victoria, B. C., will apply for a license to store or pen back 100,000 acre-feet of water from Nimpkish River, by means of a dam to be built about one mile from sea and will be used for industrial purposes. Objections may be filed with the said water recorder or with the comptroller of water rights, Victoria, B. C.

LOS ANGELES, CAL.—The city council has instructed the city attorney to prepare the usual preliminary resolution and ordinance, calling a special election for the submission of the question of voting $6,500,000 bonds to be devoted as follows: For the completion of the power plant, $1,250,000, and for providing the distribution system, $5,250,000. It is probable that the election will be held October 15th.

SAN FRANCISCO, CAL.—A suit in equity to gain possession of a strip of land in the Tahoe National Forest Reserve on which to construct the Drum power plant and conduits has been filed by the Pacific Gas & Electric Company against David F. Houston, secretary of agriculture; Henry S. Graves, head of the forest service of the Department of Agriculture, and others, in the U. S. District Court. The power company maintains that the act under which the land was set aside for forestry purposes is unconstitutional.

VANCOUVER, B. C.—From present indications the near future shall see the development of an immense store of electrical energy in British Columbia. The latest project has been announced by the Bridge River Company, a company recently organized by Vancouver capitalists. They propose developing upwards of 200,000 horsepower in the Lillooet district. They anticipate furnishing power to the Pacific Great Eastern Railway as it will in all probability electrify its western lines and also look forward to supplying power to the needs of Greater Vancouver during no distant date.

LAKEPORT, CAL.—The supervisors of Lake county have postponed to their regular meeting in September action on a resolution to enjoin the Yolo Water & Power Company from building a dam at the outlet of Clear Lake. Land owners at the head of the lake urged action at the special meeting of the board, and a number of representatives attended and addressed the supervisors. The contention is that the beginning of construction of the company's dam constitutes a menace to their lands and to county property in the shape of about three miles of lake front boulevard which would be overflowed by a ten-foot raise of the lake. Following the representations of the Upper Lake citizens, a number of Lower Lake residents protested against the supervisors involving the county in an injunction suit. Attorney Huston

for the Yolo company offered to raise the road affected to a height above possible damage by the rise of water. The company officials claim no intention of raising the lake until they have acquired rights to all lake frontage. They state they can conserve about 15,000 acre feet of water on their own land in Cache Creek Canyon without affecting the lake. The dam is located at the old Fowler mill site, six miles below the outlet of Cache Creek from the lake frontage. The structure is designed to be 32 ft. high and to back the water up the canyon and raise it to the desired ten feet in the lake when completed and gates closed.

## TRANSPORTATION.

SANDY, ORE.—Fifteen business men of this place held a conference with President Griffith of the Portland Railway, Light & Power Company for the purpose of trying to induce this company to build an electric line into Sandy. The proposed line would be about seven miles long and would connect with the Estacada line at Boring or the Mount Hood Railway at Cottrell.

SAN FRANCISCO, CAL.—The announcement of the personnel of the new directorate of the United Railroads confirmed the impression current on the street that the officers of the public utility were to be put into the hands of a board composed of representative San Francisco business men whose policy is to be one of conciliation toward and cooperation with the city authorities, in working out San Francisco's transportation problems. The new directors are: Jesse W. Lilienthal, president; Charles N. Black, vice-president; George B. Willcutt, secretary; John A. Buck, Washington Dodge, A. W. Foster, Benj. S. Guinness, J. C. McKinstry, Henry T. Scott and L. S. Sherman. With the exception of Benj. S. Guinness, who represents the New York banking firm of Ladenburg, Thalmann & Company, the new board is composed entirely of San Franciscans. A. M. Dahler continues as treasurer of the company.

SAN FRANCISCO, CAL.—Assistant City Engineer Ransom says that all plans for the new city railways for which bonds were voted last week will be completed so that contracts may be let for car barns, track specials and all material by January 1st. Material will begin to arrive before June 1st, permitting the completion of tracks and installation of overhead electrical equipment in time for the arrival of the cars from the factory in the fall. City Engineer O'Shaughnessy reiterates his statement that all the roads will be in operation for the opening of the exposition. The Van Ness avenue and Potrero lines will be the first constructed, and the rails of the Stockton street line laid as the tunnel work progresses. Negotiations for the transfer of the Union street line to the city when the franchise expires in December will be opened at once by the city attorney and supervisors. The latter will take action to provide for the acquisition of the necessary rights of way for the car barns, terminal sites and widening of Division street.

SAN FRANCISCO, CAL.—Work on the appraisement of the Presidio & Ferries Railroad Company s holdings has been started by City Engineer O'Shaughnessy and his assistants, and rapid progress is promised. The franchise of the company's Union street line expires December next, and it is probable that this will be the first of the proposed municipal car lines to be completed. City Engineer O'Shaughnessy says: "There is no reason why the city and the Union street car line officials should not reach an early settlement in the matter of the appraisement of the ompany's holdings. The first thing the city has to decide is how much of the property and holdings of the company it wants to acquire From my personal inspection of the line I am of the opinion that the city will be able to use at least 75 per cent of the company's track, as about that portion of it consists of heavy rails of the standard to be used on the municipal lines. This, naturally, will facilitate the city's operation of the line. There are other details for the city to work out in the matter of determining, the amount, if any, of the rolling stock of the company, its barns and other equipment. that is needed by the city. I am sure that this can all be adjusted quickly and to the satisfaction of all parties concerned."

OAKLAND, CAL.—All the east-bay cities and towns served by the San Francisco-Oakland Terminal Railway Company, except Berkeley, have agreed, through their mayors and councilmen, in conference at the Oakland City Hall, to withhold for one year further demands for street improvements and railway extensions. The concession was made as a means of assisting in the rehabilitation of the finances of the public utility company. Mayor Heywood of Berkeley and his associates in the city council favored the formation of a municipal traction district to take over the roads. John S. Drum of the F. M. Smith advisory committee, explained that an extension of time on the $2,500,000 loan from Halsey & Company has been promised providing running expenses of the road can be taken care of. Estimates submitted by W. R. Alberger, general manager, show that $50,000 per month will be required more than the income of the roads to meet payments on extensions and improvements which have already been begun. This money is to be loaned by local banks. Gavin McNab and Drum both declared that the company is in healthy condition so far as physical properties and earnings are concerned. The cities on the east side of the bay have received more from the Smith traction properties as a privately owned corporation than if the communities had themselves owned the system, McNab declared, for they have gotten back all its profits and about $4,000,000 more in extensions.

## TELEPHONE AND TELEGRAPH.

MOSCOW, IDAHO.—T. A. Meeker, manager Moscow Telephone & Telegraph Company, states that two toll lines will be built out of Moscow at a cost of $10,000.

CHEHALIS, WASH.—A franchise has been granted to the Rainy Valley Telephone Company for a line from Filton Ferry to Randle by way of Cowlitz River road, and to Hannaford Skookum Telephone Company for a line northwest of Centralia in Manna Hannaford valley.

LOS ANGELES, CAL.—A six-story fireproof building is to be erected by the Pacific Tel. and Tel. Co., on the site of its present building at 622 South Hill street. Plans are now being drawn, and construction work will begin in the near future. The building will be designed for twelve stories, although only six will be built at the present time.

EUGENE, ORE.—Arrangements will be made for extension of the McKenzie government telephone from summit of Sisters in Eastern Oregon, where conections may be made with portions of the Cascade, Santiam, Deschutes and Umpqua forests. C. R. Seltz, supervisor, Cascade National Forest; Chas. H. Flory, chief forester for Oregon and Washington.

SAN FRANCISCO, CAL.—The public utilities committee of the supervisors has recommended the adoption of Vogelsang's resolution asking the city attorney to ascertain on what terms the Pacific Telephone & Telegraph Company will compromise the existing litigation over the merger of teh two companies, the Pacific and the Home. Under the Pacific company's suggested terms the city would receive a percentage of $5000 a month. or $60,000 a year, which would mean something between $2,500,000 and $3,000,000 for the city during the term of the Home company's franchise, the conditions of which the Pacific company offers to assume for the entire business of both systems. Under its original franchise the Pacific Company pays no percentage to the city, but the Home franchise calls for 2 per cent of the gross receipts.